An Inaugural Essay on Cuticular Absorption.

Submitted to the examination of the Rev. John M.c Dowell D.D. Provost the Trustees and Medical Faculty of the University of Pennsylvania on the 12.th day of April 1808 for the Degree of Doctor of Medicine.

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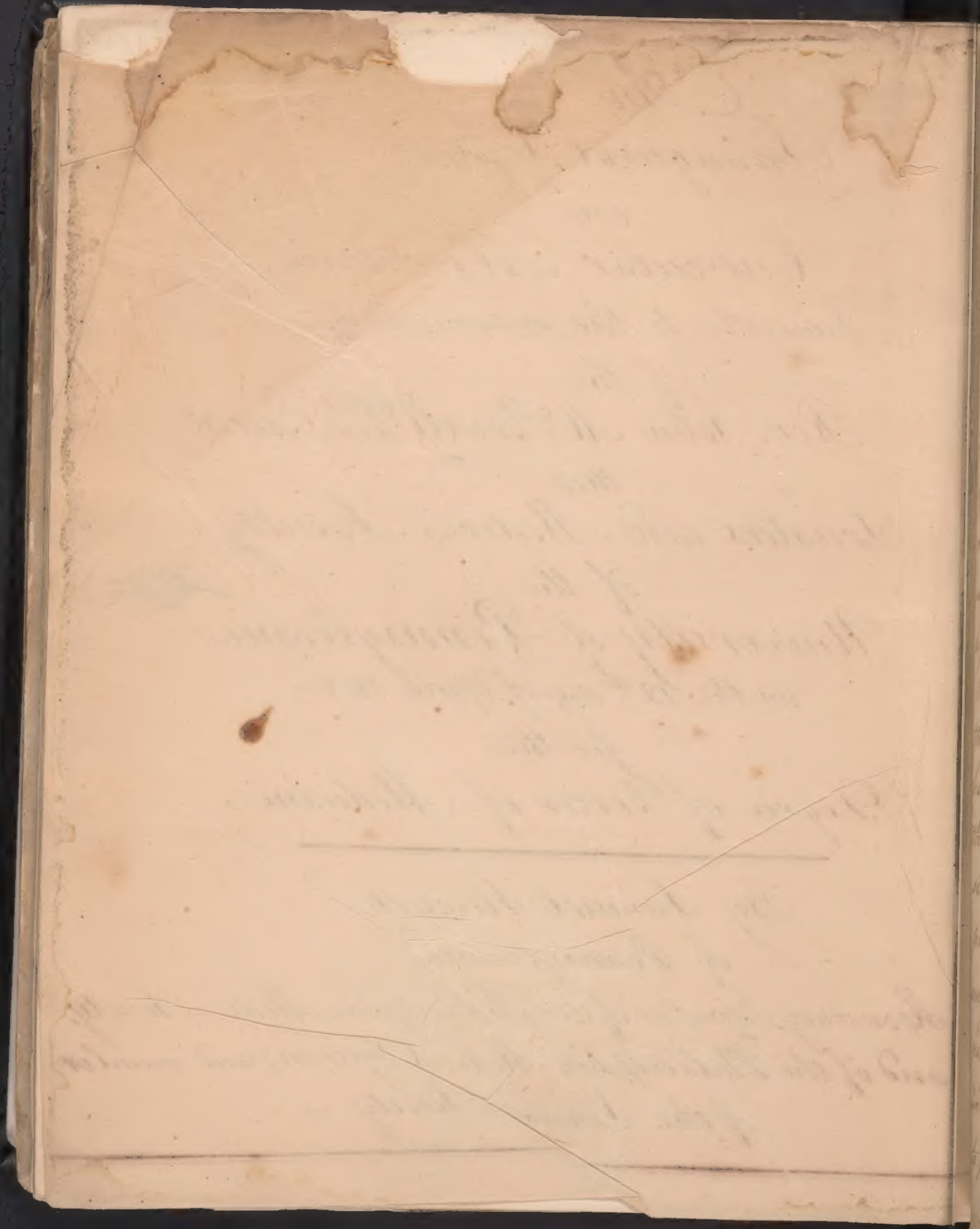

Introduction

Cuticular absorption, a subject which has occupied considerable share of attention, and exercised considerable ingenuity, but which still continues to be enveloped in the deepest obscurity, has presented itself for the subject of my inaugural essay — The many interesting and useful points which this Question involves, renders it particularly important — By a satisfactory solution of it, we will be directed in the administration of many of our remedies, and the most efficacious mode of avoiding the remote and exciting causes of disease, will be pointed out. It may also afford a more satisfactory solution of that interesting Physiological question, Fœtal nutrition, than that at present received. Simply with a hope to raise a corner of the veil which envelopes these important subjects, and also to fulfill a law of the University, have the following experiments been instituted — In conducting them an anxious desire was felt to ascertain the truth, on which side soever it might appear — Stimulated by a theme so noble, every precaution was used to render them completely conclusive, and every source of fallacy avoided, as far as my humble talents would permit — Should they succeed in dispelling a portion of the gloom, and thereby stimulate some more skillful investigator of nature to prosecute the subject, and by completely illuminating its hol-

hoard recesses, benifit mankind; the expectations of the
Author will be amply gratified

An Essay on Cuticular Absorption.

A complete and satisfactory knowledge of any function, is only to be obtained by commencing the investigation at the organs primarily engaged in the performance of it. In the performance of that function which is to constitute the subject of the following pages, the absorbents are the principal agents — By the term absorbents, I mean to imply not only lymphatic vessels, but also lacteals — That the latter communicate immediately with the internal surface of the prima viæ, and are capable of taking up articles congenial to their nature, is denied by none: I shall therefore confine my present observations to the former, or lymphatic vessels, and endeavour to prove that they not only commence on the exterior surface of animate bodies; but absorb articles applied to that surface — That vegetables have vessels, commencing on their exterior surface, which absorb articles applied to it, is proved by many facts — If plants be secluded from oxygen gas, they will not vegitate, but die; as is proved by the experiments of Ingenhousz If the oxygen be not absorbed, whence its benign influence, Must we not have recourse to the doctrine of sympathy? Doctor

Priestly's experiments unequivocally prove that carbon is absorbed by the leaves of plants, and those of Saussure demonstrate, that carbonic acid gas applied to their leaves, is essential to vegetation — Abstract it, & they wither, & die — Doctor Hales, observing that the weight of plants was much increased during moist weather, rendered it probable that they absorbed water — This the genius of Bonnet left no longer questionable. He shewed that leaves continue to live for weeks when one of their surfaces is applied to water, and even nourish a whole branch with which they were connected —

The above facts prove to demonstration, that the leaves of plants not only perform the office of respiratory organs for the plant; but also furnish it with all the nourishment essential to its existance

That they are furnished with an Epidermis and true skin (those barriers to absorption) Saussure has shewn —

As we progress in the chain of creation, and approach the inferior orders of Animals; we find them all posess the function of cuticular absorption, hence if they be covered with oil, they soon die. This has been attributed entirely to the cuticular vesels being their respiratory organs. That this opinion is true so far as it comports with the vegetation of plants, I am ready to admit: But that Oxygen is the only Pabulum vitæ taken into the system by these Vesels, is by no means so obvious, and is incompatible with the follow

ing experiment of Dr. E. Green —

"I passed a ligature (says the Doctor) round the head and tail " of a worm (The Lumbricus terrestris of Linnæus) weighed it, and placed " it in water. After remaining in it 24 hours, it had increased in weight " 3 grains. The animal received no injury from the experiment. "

Doctor Monroe in his physiology of fishes, by throwing an injection in a retrograde direction into the lymphatic vessels of the skate, has satisfactorily proved, that in that animal the absorbents do commence on the surface. The same is the fact with the Sea Egg Echinus Marinus of Linnæus, and it is presumable that were not the human absorbents valvular, their evidence could readily be obtained to substantiate the above — This point being clearly demonstrated, to deny that they absorb, would be to impeach nature with a work of supererogation: For if absorption be not their office, none I presume can be assigned to them —

Having shewn that lymphatic vessels commence on the exterior surface, at least of some animals; and rendered it probable that they as well as the other lymphatics and lacteals, do absorb fluids brought in contact with their mouths; I shall now endeavour to point out the manner in which this function is performed. Of the different opinions which have been advanced on this subject, I shall adopt the following —

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

...res of the fluid. We find therefore that fluids will be more readily ...rbed in proportion to their tenuity and stimulating power. From the above position we are led to conclude, that all fluids whether they possess the principles generally considered alimentary or not, will be taken up ... absorbents, and so assimilated as to constitute congenial nutriment ... become a part of the general system. That this opinion is not a mere chimera, is I think proved by the following considerations. Nearly all the elementary bodies in nature, have been found in the vegetable kingdom. Many of them from their qualities would appear least unlikely to be taken up by the absorbents; as Iron, Gold, Phosphorus, Sulphur &c. but when we revert to the fact that the Diamond, one of the hardest ... in nature, is capable of undergoing such change as to afford [illegible]

[illegible]

[illegible] ... seeing the Mammalia, the constituents of whose bodies have [illegible] mixed, derive their aliment either directly or in-

[illegible] the vegetable kingdom [illegible]
[illegible] in the mineral kingdom [illegible]
[illegible]
[illegible] of the superior [illegible] of [illegible] the class of
[illegible] part from the former, they will
[illegible]
[illegible] as extraneous agents, but constituents of the animal machine, are
[we] not constrained to acknowledge them [elementaries]? Elementary substances
[illegible] the system, if they be elements, retain their [illegible]
properties, however they may be, by the [illegible]
combined with other agents — That this is the case, the following facts
prove: If plants be deprived of carbon for nourishment for a considerable
[illegible]
of the same species be planted, the one in a calcareous soil,
[the] other not; the fibres of the former will on analysis afford the
[illegible]
[illegible] plants [illegible] former [illegible]
[illegible], the latter [illegible]
[illegible] constituents [illegible]
[illegible] nutriment [illegible]
[illegible] them [illegible]
[illegible]
[illegible] in embryo

They will acquire the colour of their nutriment. See Adam's Mystery

[illegible] that the absorbents [illegible] animals [illegible]

[illegible] of the animal creation [illegible] unknown, [illegible] in the mass of animal matter —

[illegible] experiments [illegible] insufficient [illegible] the following experiment [illegible] weight — "[illegible] tube [illegible] spirits of turpentine" [illegible] friction of the [illegible]"

[illegible] the painful ones created by the [illegible] "
[illegible] the attendant to continue it without [illegible]. [illegible] "
[illegible] of this fluid, therefore, so far from being [illegible] intermitted, "
[illegible] [illegible]ingly continued throughout the experiment so that the [illegible] "
is [illegible] the [illegible] [illegible] of friction, [illegible] [illegible] "
the substance with which their mouths were besmeared. [illegible] "
than hour elapsed when my assistant received my urine in a [illegible] "
[illegible], but could not discover the least smell of Violets. The hour being "
[illegible] my body was carefully washed — I then closed my mouth "
[illegible] nose, and [illegible] [illegible] into the next room, examined my "
urine without [illegible], [illegible] to detect in it the odour by which the ab- "
sorption of turpentine was to have been proved. My friends also ex- "
amined my breath, and were unanimous in saying it [illegible] "
[illegible]. The common tests were frequently resorted to during the "
succeeding 24 hours, but with the same results. — "

[illegible] the above experiment, though at first view so plausible, the following objections arise. The period at which the urine was taken was too soon after the commencement of the experiment, [illegible] [illegible] substantiated by an experiment hereafter to be noticed. The examination of the urine was made by his assistant whose olfacto[ry] [illegible] [illegible] [illegible] to the [illegible] of the [illegible] during the experiments, must have been very much obtunded. Upon the [illegible] of the hour the Doctor observes that he himself having not been washed, retired into the next room and examined his

urine. Where the objection made to the assistant, applies with equal force, admitting that the turpentine was absorbed. [illegible] [illegible] has not informed us with what [illegible] was washed. [illegible] [illegible] more serious may arise, as the odour of the turpentine can not be washed from the skin by cold water, nor yet by warm water and soap but with the utmost difficulty. It is [illegible] presumable that the odour of the turpentine whilst the Dr was examining his urine, so stimulated his olfactories, as [illegible] render [illegible] completely unsusceptible of impressions from the more subtle odour of violets even though it did exist ever so perfect. This suggestion is strengthened by the circumstance that examination was made in the next room, which from the expression we infer was an adjoining room, the intermediate door was probably open during a part of the experiment [illegible] must have been [illegible] [illegible] his sense of smell therefore (admitting the turpentine [illegible] [illegible] washed off his skin) must have been assailed by the odour which escaped from the room in which the experiment was instituted into that in which examination was made. — Examination of his breath was made by his friends, he does not mention at what times nor where; Circumstances of primary importance. [illegible] [illegible] [illegible] experiment unconclusive, first because the term of its continuance is not sufficient — secondly. Examination of his urine was made by persons, not calculated to determine the point. Thirdly. The time of

[illegible] of the breath, and where it [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] to the [illegible] of turpentine; and is therefore [illegible].

[illegible] ingenious experiments have been instituted by Dr. [illegible] relative to the present question, but from the smallness of the surface exposed to the different agents which he used for the purpose, no conclusive inferences on the subject could be drawn.

[illegible] the introduction of this [illegible] [illegible] [illegible] [illegible] [illegible] together with its gravity; there is every reason to suppose the [illegible] [illegible] of this [illegible], were [illegible] [illegible] incapable of [illegible] [illegible] and the little imbibed could not be expected to impart [illegible] its specific qualities to the urine or breath.

Dr. Currie has instituted some experiments on the warm bath [illegible] merit attention. Dr. Currie found that after bathing in the [illegible] bath, the temperature of which was 82° of Fahrenheit, the weight of his body was not increased, but if any thing, diminished. He also found that in a case of Dysphagia, where a bath at the temperature of 96° was used, no increase of weight [illegible] [illegible] though the [illegible] [illegible] after being carefully [illegible] immediately [illegible] [illegible] [illegible] which would have detected a [illegible] [illegible]. From the above experiments we find that no increase in the weight of the body [illegible] [illegible] during [illegible] — According to the experiments of Mr. Cruikshank, [illegible]

[illegible] to have perspired upwards of seven pounds in twenty four hours at the temperature of 71° – If then at the temperature of 71°, seven pounds were perspired, certainly it is reasonable to infer that a much greater quantity is perspired at the temperature of 82° in the same period of time. At the temperature of 97° it must have still been perspiration increased: in the latter case the circumstances that no absorption would take place it would have been seen the former one. [illegible] the powers of nature always [illegible] in the present instance have supplied her wants – though the doctors conclusions be correct, they do not at all disprove the doctrine of cuticular absorption – The temperature of 97° acting on a system diminished [illegible] the body in its then weak and emaciated state, must have given perspiration, and evaporation proving that effect to be more [illegible] efficient under these circumstances than in health –

From the above facts the following conclusions are deducible. The same circumstances influence the action of the exhalant & absorbent vessels. Their regular action on the surface as well as the more internal parts of the body, is necessary to keep up the equilibrium of the system – if then the absorption be equal to the exhalation the weight ought to be precisely the same; but if

[illegible] the [illegible] [illegible] in the more internal [illegible] of the body throw out more than the absorbents take up [illegible] diminution of weight ought to take place [illegible] in [illegible] support their equilibrium the contrary of which I believe has not [illegible] proved that the exhalant [illegible] or capillary arteries in the system, do in a healthy state throw out more than is taken up by the [absorb]ents as [illegible] be the phenomena of growth. From the above [illegible] [illegible], that nature ever fond of order, does not in this instance break [th]rough what appears to be a general law, but [illegible] [illegible] also absorbent surfaces, as all the membranes of the human body also the lungs —

Taking it for granted that absorbents do originate from every [illegible] of the body interior to the cuticle, I instituted the following ex[pe]riment with a view to ascertain whether the absorbents would [ta]ke up garlic in sufficient quantity to render its presence [illegible] [illegible] in the urine.

[illegible] aged 60 years having an ulcer on his leg about 8 inches [in] circumference, his nostrils filled with tent and confined with [adh]esive plaster breathed the external air through a tube, an [illegible] of the expressed juice of garlic with an equal quantity of [illegible] [illegible] to the surface of the ulcer by means of half

bladder out [illegible], the cut edges being made to lay flat
[illegible] of small [illegible] were [illegible] to the [illegible] skin by means
dhesive plaister, over which bandages were rolled to retain it in its
[illegible]; the fundus of the bladder having a pipe adapted to it through
which the fluid was poured, and the pipe corked. In this situation he con-
[illegible] to breathe through the tube [illegible] minutes, when it having
[illegible] with perspirable matter he began to [illegible]
[illegible] with difficulty - A quantity of his urine was now obtained in a
[illegible], corked and conveyed out of the room, when it was very particularly
[illegible] by persons not exposed to the odour of garlic; yet the slightest
smell of it could not be distinguished - Leaving the tube and restrain-
ing his respiration, he precipitately retired into the next room, on examin-
[illegible] the [illegible] found that none of the garlic had leaked out, and its smell
being very small he retired to the surgical ward in which he was a patient -
[illegible] a number of the patients to smell the bladder [illegible]
what were its contents, which they did, and some in a doubtful manner
[illegible] that it was garlic. Finding the odour so exceedingly small, I
[illegible] to leave it be on all night and desired the man to retain
[illegible] urine till the morning; when on the most minute examination,
both by myself and a number of others, the slightest odour of garlic
[illegible] not be detected. [illegible] the result of this experi-
ment [illegible] be [illegible] of the existence of [illegible]

[illegible] in contact with the mouths of which the [illegible] [illegible] have [illegible], I [illegible] to repeat the experiment [illegible]

Experiment 2nd. [illegible] aged 57 years [illegible] [illegible] by a [illegible], his [illegible] [illegible] [illegible] place as above, except that [illegible] [illegible] that [illegible] in [illegible] position, [illegible] [illegible] the [illegible] [illegible] [illegible] of [illegible] off was used. Bladders sufficiently large to [illegible] the ulcers, which were upwards of eighteen inches in circumference, were prepared and applied as above [illegible] [illegible] [illegible] with [illegible] [illegible] [illegible] bladder [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] hours, [illegible] [illegible] [illegible] [illegible] they [illegible] [illegible] [illegible] the next room [illegible] his respiration [illegible] [illegible] [illegible] [illegible] [illegible] with [illegible] [illegible] the [illegible] of [illegible], which was however [illegible] — [illegible] was afterwards repeatedly [illegible] but with [illegible] [illegible] — [illegible] the above experiments it may be objected that the ulcers were [illegible] chronic, and consequently the action of the absorbents weak [illegible] they go to shew us the absurdity of concluding that absorption does not take place through the cuticle, [illegible] [illegible] [illegible] inches thereof were exposed to an [illegible] very [illegible] short time — [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] was [illegible] in

[illegible] contact with the mouths of the absorbent vessels [illegible] it they did not take [illegible] in sufficient quantity to render it [illegible] — [illegible] will certainly allege that absorbents do not exist in an ulcer, the contrary may be proved to demonstration. A portion of the edge of an ulcer shall cicatrize in a short time [illegible] in consequence of exercise, fever [illegible] [illegible] [illegible] by removing the causes of disease [illegible] [illegible] [illegible] absorbed in a very short time.

[illegible] it is a fact notorious to all farmers, that the milk [illegible] [illegible] [illegible] [illegible], are strongly impregnated with [illegible] odour and taste; not conceiving it requisite that the odour of [illegible] might reach the milk through the medium of the [illegible], I instituted the following experiment. —

Experiment. [illegible] a female was preferred on account of the greater facility of drawing off the urine by means of a catheter [illegible] having confined her, made an opening into the Trachea, into which I introduced a pipe communicating with the external air, [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] to be used — After breathing through the tube two hours, the bandages were taken off; and my skin carefully washed with warm soap-suds; Nevertheless some odour of the garlic remained on my skin — I now restrained my respiration and retired to my room, when some of my friends who had not been exposed to the odour of garlic, examined my breath, and could very distinctly observe the smell of garlic. The utmost attention was paid to distinguish the odour of garlic in my breath from that on my skin; but so strong was the former that they were unanimous in declaring no doubt existed with respect to it — My urine which I made near the conclusion of the experiment was [illegible] from [illegible] and carefully examined, when the odour of garlic was so distinctly perceived, as to preclude a doubt of its existence there. — The urine voided some time after the conclusion of the experiment was also examined, and with the same result. Though there could remain no doubt that the garlic had entered the system and displayed itself in the urine and breath; nevertheless, the mode of its introduction was not so certain — A considerable time after the commencement of the experiment, I was sensible of the odour of garlic — Whence it arose from I could not determine. [illegible] in my [illegible] a distinct [illegible] in my mouth; yet [illegible] plaster was not so completely [illegible] as at the commencement of the experiment [illegible]

i'd a little of the air of the room might possibly have passed through my nostrils or that during inspiration some air might have entered my mouth exterior to the tube — Unable to determine whether the odour had entered my system through the lungs, or had been taken up by the absorbent vessels on the surface, conveyed to the blood, and made its exit at the lungs — This uncertainty induced me to repeat the experiment in the following manner —

Experiment V.

A piece of pasteboard was adapted to the size of a pane of glass, in the middle of it a hole was made exactly suited to my neck, making a slight degree of pressure all around. a fissure was made from the edge into the hole. Then by bending it was placed round my neck, adjusted in the window instead of a pane of glass, and completely confined by putty, as also the fissure — Thicken, flannel was now put round my neck in such way as to completely close any interstice which might exist between it and the pasteboard — All communication of air being now cut off as completely as a room well can be, and the small quantity which did circulate passing in with rapidity; The temperature of the external air being 43°, that of the room 61° at the commencement of the experiment. Rollers soaked in equal parts of Milk and the expressed juice of garlic, were now regularly applied, commencing at the superior extremities, and continued over the body till they reached the knees — Bruised garlic in substance was placed in the axilla and groins — At the commencement of the ex-

[illegible] my pulse beat 92 strokes in a minute. its natural standard. In 35 minutes it continued at 92. the temperature of the room had now risen to 68°. — In 50 minutes, pulse 96 and somewhat irregular, thermometer 70. — I was sensible of a degree of irritation in my trachea though unable to distinguish the least odour of garlic which that I might be convinced none had passed through the window, I had occasionally endeavoured to do from the commencement of the experiment. I now voided some urine in a vial which was immediately corked up and [illegible]. In 55 minutes I was sponged with milk and expressed juice of garlic equal parts, raised to the temperature of my body. In 55 minutes pulse 88 small and without tension, thermometer [illegible] I felt convinced that I could perceive the odour of garlic when I expired. but though I used every endeavour to discover it when I inspired could not. In 75 minutes, pulse 9[illegible] small and quick, thermometer [illegible]. I again voided some urine in a vial which was corked and numbered as before. — I was fully satisfied from the sensations I experienced in my trachea and from the odour and taste of the garlic, which I distinctly perceived, that on examination it would be detected by others, and therefore spoke of concluding the experiment; but was advised to continue it till two hours should be elapsed — In 90 minutes, pulse 85, thermometer 73. the sensation of garlic in the trachea, more acrid, and on making a full expiration stronger, but on inspiring I was not able to detect the odour. the air was somewhat crisp. [illegible]

The matter injected was completely dissipated before 5 minutes – 105 minutes pulse 82 very irregular and small. Thermometer 75° I now pushed with a third tube which was managed with ease – In 120 minutes pulse 84, a little fuller and more tense than before the experiment was considered as terminated, the pillow taken off and my body well washed with warm water and soap, and a blanket folded round me; when forcibly drawing the first breath out of the window and restraining my breath, I precipitately retired down stairs to the house where my breath was accurately examined by my friend Colleague Mr Smith and several other Gentlemen who unanimously concurred in declaring that they smelled the odour of garlic very distinctly on it. My Colleague Mr Harris, who assisted me in the performance of the experiment did not breathe the fumes of the garlic all the time, had his breath examined by the same gentlemen, who agreed that they could not distinguish the least odour of garlic on it – Not content with their assertions as they were acquainted with the experiment, and therefore their imaginations might be supposed to exert an influence, Mr Farrer and myself went into one of the wards, where they were entirely ignorant of the experiment, and out of six persons who smelled our breaths, four declared they could not distinguish any smell whatever on his, whilst on mine that of garlic was perceptible – He felt conscious that a slight smell was perceptible on his, yet not to be compared with mine in strength.

After the conclusion of the experiment, I made some more

* I did it with the view to render my situation more comfortable, and consequently the experiment more decisive: But both on the same number of Blankets were given me and removed when I was sponged &c.

one in a vial as above - and Mr Harris, previous to quitting room in which the experiment was made, also voided some in a vial, which was corked and marked in a different manner - There were four vials which contained my urine, and Mr Harris's, which were examined by the same gentlemen, not knowing one from the other. [illegible] were unanimous in declaring that No 1 and Mr Harris's had not a perceptible smell of garlic - No 2 had a slight smell, but in No 3 & 4 it was obviously distinguishable, as will more fully appear from the following relation - In company with a friend I took all the above vials into the Mens Surgeon Ward, and without giving them the most distant idea of their contents, asked each person, & what they smelled - they almost to a man declared that No 3 & 4 had a very perceptible smell of garlic, No 2 had it in a slight degree, but that No 1 & Mr Harris's had no odour but that of urine.* -

This experiment was so conducted as almost to preclude the possibility of error - I neither had an opportunity of smelling the garlic while preparing, nor yet while the rollers were applying. My cuticle was perfectly sound; and least it might be alledged, that the odour might have penetrated through the more thin cuticle on the Glans Penis, or passed up the Urethra or Rectum; the former was prevented by confining the prepuce exterior to the Glans, the latter by being covered with adhesive Plaister - As I conceive no error took place in this experiment, it must be considered as conclusive.

[illegible] to repeat some of Doctor Klapp's experiments & at the same time obviate one or two objections which appeared to have considerable weight, the following experiment was instituted.

Experiment VI —

A large glass jar was inverted over water and a bottle containing turpentine was then placed under the water and opposite the mouth of the jar, when the cork was drawn, the turp. rose on the top of the water in the inverted vessel — This was done in the morning and the experiment not commenced till the evening so that if any smell of the turpentine should have escaped from the vessel when brought into the room its odour might be dissipated previous to the commencement of the experiment, before commencing which the temperature of the water was increased to 85 degrees. Then passing my hand and arm into the inverted jar the turpentine surrounding my hand and half my fore arm — In about 25 minutes I felt very considerable irritation from the turpentine which continued to increase 'till an hour and a half were elapsed, even feeling no symptoms of the turpentine in my system whatever, and the smarting of my hand and arm being very severe, I was about to terminate the experiment; but as several gentlemen were at this time engaged feeling my pulse with respect to which they differ somewhat, I postponed it a quarter of an hour longer, when feeling something acrid and irritating in my trachea which I

will attribute it to no other circumstance than the absorption of the turpentine. I resolved to continue the experiment.

My friends now examined my breath, and all concurred in declaring that they smelled something peculiar in it, and different from what it was at the commencement of the experiment. I then had it examined not knowing what odour the turpentine would impart would reach the lungs — Out of six gentlemen who were present, four declared decidedly, that they could perceive the odour of turpentine on my breath and the other two, though they conceived they could discern a difference, were not so decided —

I took a portion of urine in a vial previous to commencing the experiment, at the end of one hour I again made a little, at the end of an hour and three quarters, when I began to feel the irritation in the bladder mentioned above, I voided a little more, and again at the close of the experiment; which continued 3 hours — All the vials immediately on the urine's being taken, were corked and numbered, that no mistake could arise. On the following morning I retained a portion of my urine. There were now five vials all of which I took to the surgical ward where they were examined. It was found that N°1. the vial that was taken previous to commencing the experiment, and N°. 5. taken the succeeding morning, had no smell different from urine. N°2 the alledged had a smell

[illegible] different from the former. Nos 3 and 4 they declared [illegible] a smell different from urine, one alleged that it contained some vegetable, another that it resembled tea, and a third that it was like briar root. —

On the afternoon of this day, no odour different from natural existing either in my urine or breath, I took twenty drops of spirits of turpentine, taking care previous to taking it to retain some of my urine in a vial; in an hour and a half after taking it, I again voided it, and in 3 hours some more; these were first examined by my colleagues and compared with what I had made during my former experiment. They were of opinion that if the smell of either could be compared to violets Nos 3 & 4 of the former, and Nos 2 & 3 of the latter were best entitled to it. I then took them to the surgical ward as before. The first person who smelled them compared No 2 and 3 of this experiment to Nos 3 & 4 of the former, and declared that No 1 did not smell of any thing but urine. Several others on smelling it not being acquainted with his decisions declared the same. I now obtained some violets and asked whether there was any analogy between their odours. They conceived that Nos 3 & 4 in experiment No 6 and Nos 2 & 3 in experiment 7th did smell very considerably like it. For my own part, though I conceived I could distinguish a difference between the urine Nos 3 & 4 Exp. 6. and Nos 2 & 3 Exp. 7 and that which I voided under ordinary circumstances, I cannot

declare that I could satisfactorily distinguish a great likeness in it to the odour of violets - Conceiving that I probably had not taken a dose sufficiently large to bestow the smell of violets to the urine, a friend who had been in the habit of taking it, condescended to oblige me -

Experiment VIII

Captain W— took upwards of ℥ij by measure of the spirit of turpentine; previous to taking it I procured a vial of his urine, in an hour and a half afterwards another vial of it was taken, and the following morning another portion was preserved - The turpentine was taken at six O'Clock in the evening. These three vials were exposed to the same examination as those mentioned above. The two last taken after the administration of the turpentine, were conceived to bear a strong analogy to those in the two last experiments, which there was reason to allege were influenced by the turpentine - Though the smell of violets was even in this instance so extremely indistinct, that probably not one person in twenty would have declared that it at all possessed it, provided they were not prepared to expect it -

Having now endeavoured to furnish my mite towards the progress of science; it now remains for me, Illustrious Professors, to bid you adieu - Not the brilliant scenes which youthful fancy paints can drown the regret produced by the reflection that I

am about to quit that sphere, so often illiminated by your supe-
rior talents and graced by your virtues — Accept, Gentlemen,
my unfeigned thanks for the many benefits you have conferred
upon me; and that health and long life may enable you to
bestow the same advantages on others, is my sincere wish —

F S N S S —